

Valley Creek Spring/Summer Chinook Salmon Population Population Viability Assessment

The Valley Creek chinook population (Figure 1) is part of the Snake River Spring/Summer Chinook ESU which has five major population groupings (MPGs), including: Lower Snake River, Grande Ronde / Imnaha, South Fork Salmon River, Middle Fork Salmon River, and the Upper Salmon River group. The ESU contains both spring and summer run chinook. The Valley Creek population is characterized as a spring run adult life history type, although IDFG classifies it as containing both spring and summer run. The population is one of eight extant populations in the Upper Salmon River MPG.

The ICTRT classified the Valley Creek population as a “basic” population (Table 1) based on historical habitat potential (ICTRT 2005). A chinook population classified as basic has a mean minimum abundance threshold criteria of 500 naturally produced spawners with a sufficient intrinsic productivity to achieve a 5% or less risk of extinction over a 100-year timeframe.

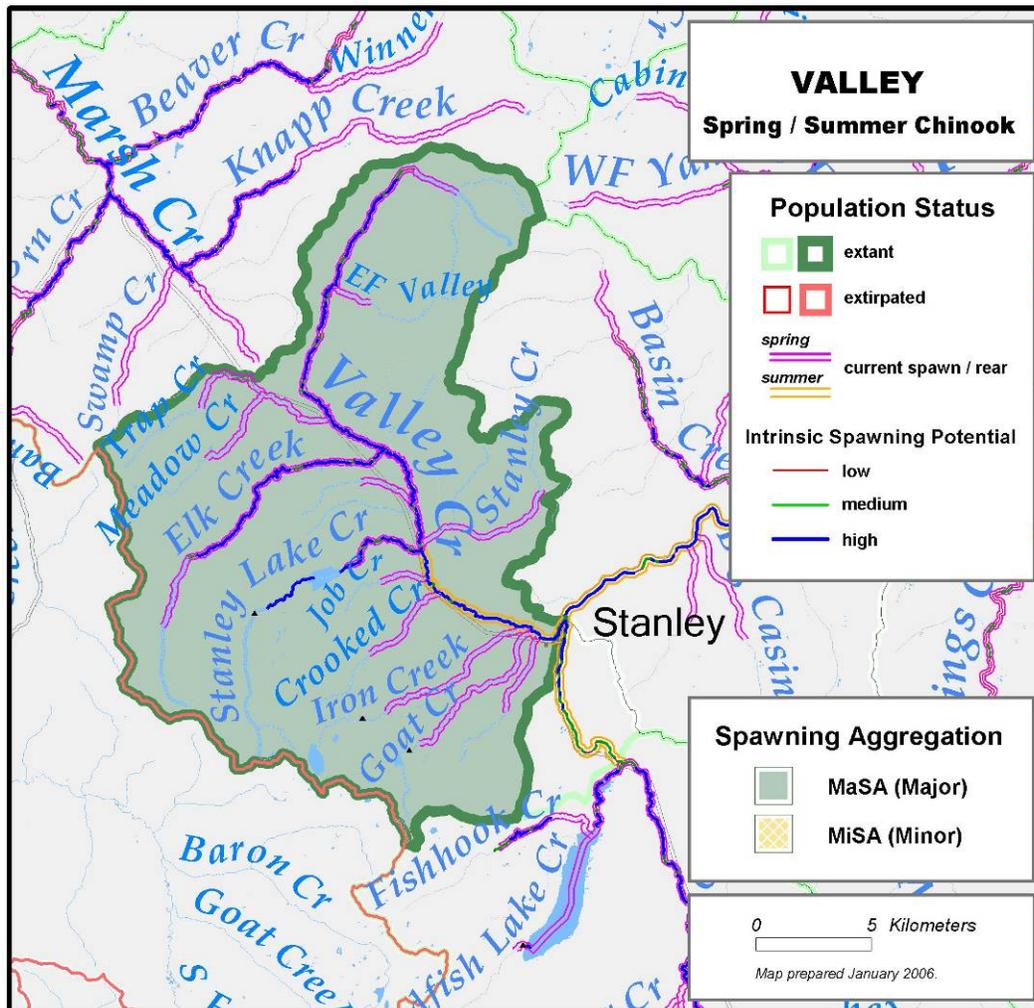


Figure 1. Valley Creek chinook major and minor spawning areas.

Table 1. Valley Creek chinook basin statistics

Drainage Area (km ²)	377
Stream lengths km* (total)	157
Stream lengths km* (below natural barriers)	143
Branched stream area weighted by intrinsic potential (km ²)	0.274
Branched stream area km ² (weighted and temp. limited)	0.274
Total stream area weighted by intrinsic potential (km ²)	0.274
Total stream area weighted by intrinsic potential (km ²) temp limited	0.274
Size / Complexity category	Basic / "A" (simple linear)
Number of MaSAs	1
Number of MiSAs	0

*All stream segments greater than or equal to 3.8m bankfull width were included

**Temperature limited areas were assessed by subtracting area where the mean weekly modeled water temperature was greater than 22°C.

Current Abundance and Productivity

Current (1957 to 2003) natural abundance (number of adult spawning in natural production areas) has ranged from 0 in 1995 to 1,496 in 1957 (Figure 2). Annual abundance estimates for Valley Creek were based on expanded redd counts. IFDG has surveyed three index areas within Valley Creek for spring and summer chinook spawning (IDFG #NS4, NS3-a, NS3-b). We summed the annual counts across index areas and applied two expansion factors to generate estimated annual spawner numbers. The first expansion factor was the ratio between an estimate of the total weighted spawning area currently accessible in the population, and the weighted amount of spawning area within the index count reaches. The index areas represented 67% of the area currently identified as being in use for spawning. We also applied the Middle Fork average fish per redd (1.82) to generate estimated spawners (Table 5). The resulting total expansion factor was 2.72.

Recent year natural spawners include returns originating from naturally spawning parents. A thorough review of spawner carcass data has not been done. The presence of hatchery strays in the population is unknown; they likely have not been present and spawning in the population in most or all years. Potential strays most likely would originate from proximate upstream upper Salmon River Mainstem population (Sawtooth Hatchery Program). Spawners originating from naturally spawning parents have comprised an average of 100% since 1953 (Table 2).

Abundance in recent years has been variable, the most recent 10-year geomean number of natural spawners was 35 (Table 2). During the period 1979-1998, returns per spawner for chinook in Valley Creek ranged from 0.07 (1987) to 14.17 (1996). The most recent 20 year (1978-1997) SAR adjusted and delimited (at 75% of the size threshold) geometric mean of returns per spawner was 1.08 (Table 2).

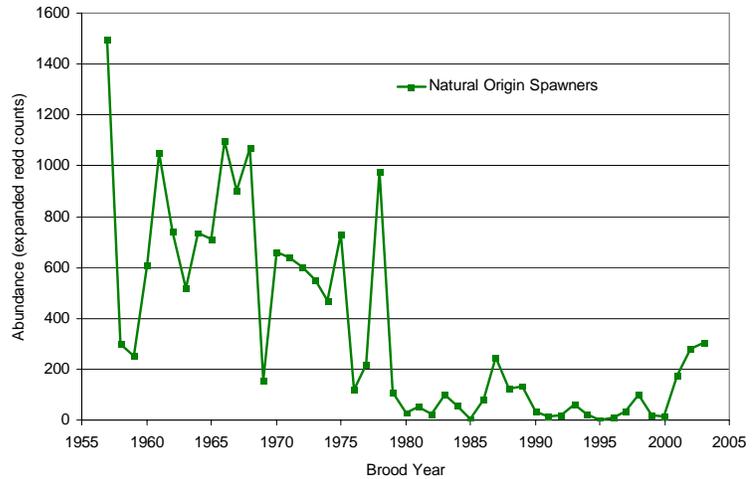


Figure 2. Valley Creek abundance trends 1957-2003.

Table 2. Valley Creek abundance and productivity measures

10-year geomean natural abundance	35
20-year return/spawner productivity	1.08
20-year return/spawner productivity, SAR adj. and delimited*	1.08
20-year Bev-Holt fit productivity, SAR adjusted	n/a
20-year Lambda productivity estimate	n/a
Average proportion natural origin spawners (recent 10 years)	1.0
Reproductive success adj. for hatchery origin spawners	n/a

*Delimited productivity excludes any spawner/return pair where the spawner number exceeds 75% of the size category threshold for this population. This approach attempts to remove density dependence effects that may influence the productivity estimate.

Comparison to the Viability Curve

- Abundance: 10-yr geomean natural origin spawners
- Productivity: 20-yr geomean R/S (adjusted for marine survival and delimited at 375 spawners)
- Curve: Hockey-Stick curve
- Conclusion: The Valley Creek population is at **HIGH** risk based on current abundance and productivity. The point estimate resides below the 25% risk curve (Figure 3).

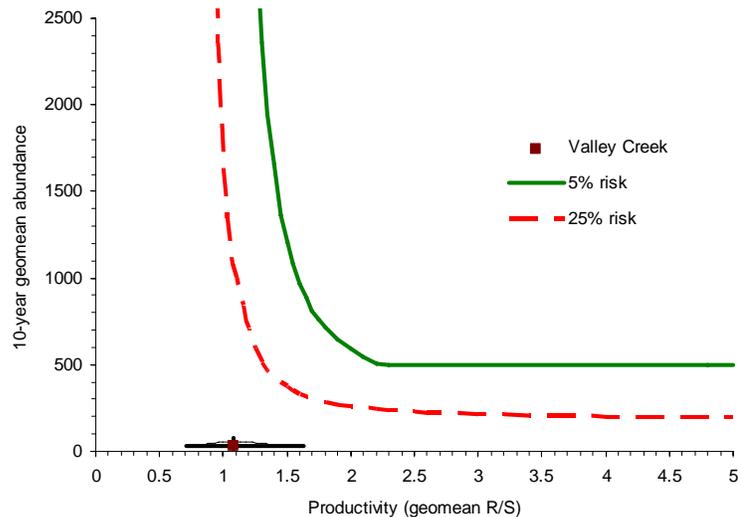


Figure 3. Valley Creek Summer Chinook abundance and productivity metrics against a Hockey-Stick viability curve. Dataset adjusted for marine survival and delimited at the median. Estimate includes a 1 SE ellipse, 1.81 X SE abundance line, and 1.73 X SE productivity line.

Spatial Structure and Diversity

The ICTRT has identified one major spawning area (MaSA) and no minor spawning areas (MiSA) within the Valley Creek chinook population. There are no modeled temperature limitations within this MaSA. Spawning is distributed broadly throughout the population from the mouth of Valley Creek to the broad valley in the upper portion of the basin and the tributary stream Elk Creek.

Factors and Metrics

A.1.a. Number and spatial arrangement of spawning areas.

The Valley Creek Chinook population has one MaSA (Valley) and no MiSAs. The total branched stream area weighted by intrinsic potential is 274,072 m², an area equivalent to 2.7 MaSAs. Even though only one MaSA was identified in the population this metric was rated *Moderate Risk* because of the total amount of habitat present and the branching provided by tributary streams.

A.1.b. Spatial extent or range of population.

The IDFG has conducted annual spawner index counts since 1957 in Valley Creek from Stanley Lake Creek upstream to East Fork Valley Creek. This metric is rated *Low Risk* because current spawning distribution mirrors historical and the historical range has not been reduced. The MaSA is occupied at both the lower and upper ends based on recent spawner surveys. Low risk is the lowest rating this population can achieve since it is characterized as a Basic A-type population.

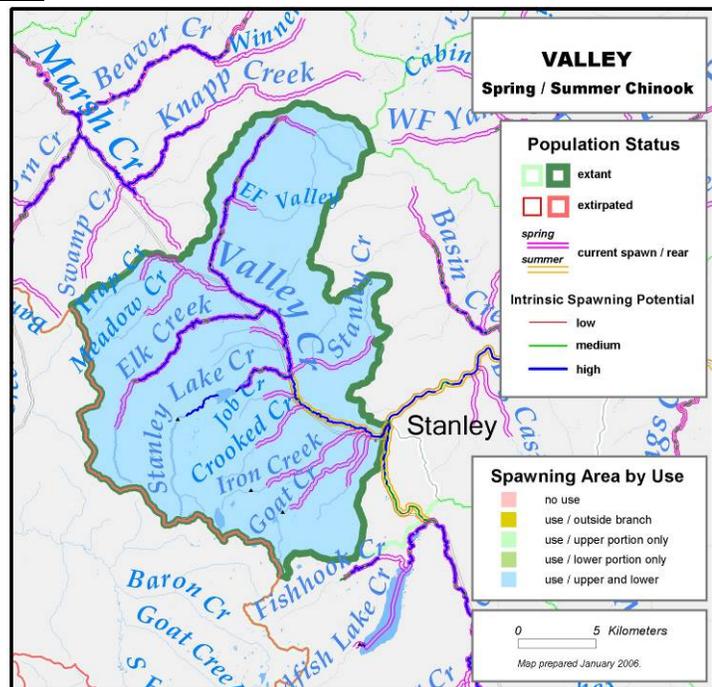


Figure 4. Valley Creek Chinook distribution.

A.1.c. Increase or decrease in gaps or continuities between spawning areas.

There has been no change in gaps when comparing current and historical spawning distribution. The population is rated at *Low* risk because the historical MaSA is occupied, gap distance and continuity have not changed, and there has been no increase in distance between this population

and other populations in the MPG or ESU. This metric cannot achieve a Very Low risk rating because there are not three or more historic MaSAs.

B.1.a. Major life history strategies.

There are limited data to allow any comparisons between historic and current life history strategies. The IDFG classifies adult spawners upstream of Stanley Lake Creek as spring run and downstream as summer run. The known major juvenile life history strategy is a spring yearling migrant. No natural or anthropogenic impacts that could have resulted in loss of a life history strategy are known to have occurred. Adult spawners still occupy the upper and lower reaches of the stream. It appears all historic juvenile and adult life history strategies are present, but because data is limited the metric is rated *Low Risk*.

B.1.b. Phenotypic variation.

There is no data to indicate that any phenotypic traits have been significantly changed or lost. No alterations of within-basin habitat conditions that could have resulted in loss of a phenotypic trait are known to have occurred. No major selective pressures exist which would cause significant changes in or loss of traits. Changes in the mainstem migration corridor (lower Snake and Columbia rivers) likely have altered timing of juvenile downstream passage and adult upstream passage. Because smolt entry into the estuary is substantially delayed relative to historic conditions, this metric is rated at *Low Risk*.

B.1.c. Genetic variation.

Genetic ratings were based on IC-TRT analysis of allozyme data presented in Waples et al. 1993. In addition, the IC-TRT analyzed WDFW and R. Waples, unpublished allozyme data, and P. Moran, unpublished microsatellite data. Among population variation showed potential homogenization with other proximate populations and similarity to Sawtooth Hatchery samples, so this metric was rated *Moderate Risk*. The USFS has rated it as “Functioning at Unacceptable Risk” for Persistence and Genetic Integrity in its Matrix of Pathways and Indicators¹.

B.2.a. Spawner composition.

Spawner composition is determined from spawning ground carcass recoveries. Any marked fish that are recovered are examined for the presence of a coded-wire or PIT tag.

(1) *Out-of-ESU strays*. No out-of-ESU strays have been detected spawning in the population and this sub-metric is rated *Very Low risk*.

(2) *Out-of-MPG strays from within the ESU*. No out-of-MPG strays have been detected spawning in the population, and this sub-metric is rated *Very Low risk*.

(3) *Out of population within MPG strays*. Hatchery-origin strays that could enter the population in recent years would originated from the upstream Upper Salmon River mainstem population (Sawtooth Hatchery). Proportion of strays spawning naturally is suspected to be less than 10% per year, and this sub-metric is rated *Low Risk*.

¹ Sawtooth National Recreation Area, Sawtooth National Forest. 1999. Biological Assessment of Effects of Ongoing and Proposed Federal Actions on the Valley Creek Subpopulation of listed Snake River Sockeye, Snake River Spring/Summer Chinook Salmon, Snake River Steelhead, and Columbia River Bull Trout and sensitive Westslope Cutthroat Trout.

(4) *Within-population hatchery spawners*. There is no within population hatchery program, and this sub-metric is rated *Very Low* risk.

The overall risk rating for metric B.2.a “spawner composition” is *Low Risk* even though very few out-of-population strays have been observed. Genetics data (metric B.1.c) indicate a similarity to Sawtooth hatchery fish

B.3.a. Distribution of population across habitat types.

The Valley Creek population intrinsic potential distribution historically was distributed across two EPA level IV ecoregions, with High Glacial Drift Valleys being predominant. The current distribution is nearly identical to the historic intrinsic distribution (Table 3 and Fig. 6). There are no substantial changes in ecoregion occupancy and this metric was rated *Low Risk* for the population. This is the lowest risk rating the population can achieve for this metric since historically only two ecoregions were represented.

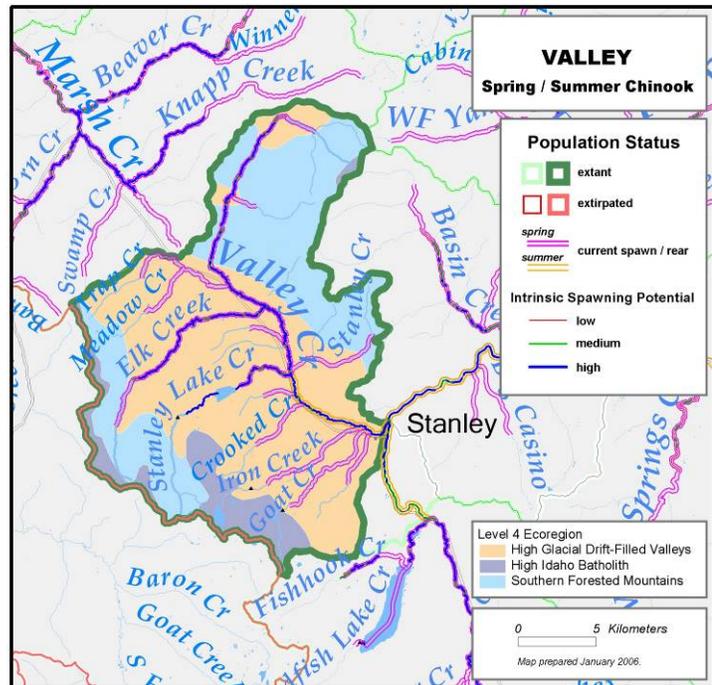


Figure 5. Valley Creek chinook population distribution across various ecoregions.

Table 3. Valley Creek Spring/Summer Chinook—proportion of spawning areas across various ecoregions.

Ecoregion	% of historical branch spawning area in this ecoregion (non-temperature limited)	% of historical branch spawning area in this ecoregion (temperature limited)	% of currently occupied spawning area in this ecoregion (non-temperature limited)
High Glacial Drift-Filled Valleys	88.3	88.3	88.6
Southern Forested Mountains	11.7	11.7	11.4

B.4.a. Selective change in natural processes or selective impacts.

Hydropower system: The hydrosystem and associated reservoirs impose some selective mortality on smolt outmigrants and adult migrants, the selective mortality is not likely to remove more than 25% of the affected individuals. The likely impacts are rated as *Low Risk* for this action.

Harvest: Recent harvest rates for spring/summer Chinook salmon are generally less than 10% annually. There are no freshwater fisheries directly targeting wild spring/summer Chinook salmon; indirect mortalities are expected to occur in some fisheries selective for hatchery fish. It is not likely that the incidental mortality is selective for a particular group of fish or if it is, it would not select 25% or more of that particular group, therefore this action was rated as *Very Low risk*.

Hatcheries: Although hatchery strays (adult spawners) have been observed in the population since 1988, the proportion of strays is assumed to always be less than 10%. This selective impact was rated *Low Risk*.

Habitat: Habitat changes resulting from land use activities in the basin may impose some selective mortality, but the extent is unknown. It is likely that any selective mortality impacts would impact a non-negligible portion of the population. The USFS² has noted that “[m]any tributaries with connections to Valley Creek have been completely lost, such as rearing habitats in Hanna, McGown, Thompson, Park, and Tennell Creeks”. This selective impact was rated *Low Risk*.

² Sawtooth National Recreation Area, Sawtooth National Forest. 1999. Biological Assessment of Effects of Ongoing and Proposed Federal Actions on the Valley Creek Subpopulation of listed Snake River Sockeye, Snake River Spring/Summer Chinook Salmon, Snake River Steelhead, and Columbia River Bull Trout and sensitive Westslope Cutthroat Trout.

Spatial Structure and Diversity Summary

Overall spatial structure and diversity has been rated *Moderate Risk* for the Valley Creek population (Table 4). The lowest spatial structure/diversity risk level the population could achieve would be Low risk because of the historic (natural) number and spatial arrangement of spawning areas and total amount of intrinsic potential habitat. The current *Moderate* risk rating is driven by the rating for genetic variation.

Table 4. Spatial structure and diversity scoring table

Metric	Risk Assessment Scores					
	Metric	Factor	Mechanism	Goal	Population	
A.1.a	M (0)	M (0)	Low Risk (Mean=0.67)	Low Risk	Moderate Risk	
A.1.b	L (1)	L (1)				
A.1.c	L (1)	L (1)				
B.1.a	L (1)	L (1)	Moderate Risk	Moderate Risk		
B.1.b	L (1)	L (1)				
B.1.c	M (0)	M (0)				
B.2.a(1)	VL (2)	Very Low Risk	Low Risk			Moderate Risk
B.2.a(2)	VL (2)					
B.2.a(3)	VL (2)					
B.2.a(4)	VL (2)					
B.3.a	L (1)	L (1)	Low Risk		Moderate Risk	
B.4.a	L (1)	L (1)	Low Risk			

Overall Viability Rating

The Valley Creek spring/summer Chinook salmon population does not currently meet viability criteria because Abundance/Productivity risk is high (Figure 6). The 20-year delimited recruit per spawner point estimate is at replacement (1.08). The 10-year geometric mean abundance is 7% of the minimum threshold abundance. Improvement in abundance/productivity status (reduction of risk level) will need to occur before the population can be considered viable. Also, the population currently does not meet the criteria for a “maintained” population.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	
	High (>25%)			Valley	

Figure 6. Viable Salmonid Population parameter risk ratings for the Valley Creek chinook salmon population. This population does not currently meet viability criteria. Viability Key: HV – Highly Viable; V – Viable; M – Maintained; Shaded cells-- not meeting viability criteria (darkest cells are at greatest risk)

Valley Creek Spring/Summer Chinook – Data Summary

Data type: Redd count expansions
 SAR: Averaged Williams/CSS series

Table 5. Valley Creek Spring/Summer Chinook run data (used for curve fits and R/S analysis). Data associated with a parent escapement above 5 spawners and below 75% of the threshold were used in the productivity calculation.

Brood Year	Spawners	%Wild	Natural Run	Nat. Rtns	R/S	Rel. SAR	Adj. Rtns	Adj. R/S
1979	109	1	109	70	0.64	0.87	61	0.56
1980	27	1	27	26	0.96	0.58	15	0.56
1981	52	1	52	53	1.02	0.63	33	0.64
1982	24	1	24	180	7.35	0.51	92	3.76
1983	98	1	98	163	1.67	0.58	94	0.96
1984	57	1	57	133	2.33	1.65	220	3.85
1985	5	1	5	70				
1986	79	1	79	24	0.30	1.41	34	0.43
1987	245	1	245	18	0.07	1.83	32	0.13
1988	122	1	122	54	0.45	0.75	41	0.33
1989	133	1	133	31	0.23	1.79	55	0.41
1990	33	1	33	9	0.27	4.65	41	1.25
1991	14	1	14	6	0.43	3.01	18	1.30
1992	19	1	19	23	1.22	1.65	38	2.01
1993	63	1	63	74	1.19	1.61	120	1.91
1994	24	1	24	48	1.94	1.04	50	2.03
1995	0	1	0	18				
1996	8	1	8	116	14.17	0.54	63	7.70
1997	33	1	33	236	7.23	0.30	70	2.14
1998	101	1	101	290	2.89	0.30	86	0.86
1999	19	1	19					
2000	14	1	14					
2001	177	1	177					
2002	280	1	280					
2003	302	1	302					

Table 6. Geomean abundance and productivity measures. Abundance and productivity values used in the current status assessment are boxed.

	R/S measures				Lambda measures		Abundance
	Not adjusted		SAR adjusted		Not adjusted		Nat. origin
	median	75% threshold	median	75% threshold	1987-1998	1979-1998	geomean
delimited Point Est.	1.94	1.08	1.97	1.08			35
Std. Err.	0.51	0.32	0.28	0.24			0.28
count	8	18	8	18			10

Table 7. Poptools stock-recruitment curve fit parameter estimates.

SR Model	Not adjusted for SAR							Adjusted for SAR						
	a	SE	b	SE	adj. var	auto	AICc	a	SE	b	SE	adj. var	auto	AICc
Rand-Walk	1.08	0.34	n/a	n/a	1.06	0.62	65.8	1.08	0.25	n/a	n/a	0.79	0.43	55.3
Const. Rec	52	13	n/a	n/a	n/a	n/a	58.6	52	8	n/a	n/a	n/a	n/a	39.7
Bev-Holt	8.39	16.88	64	29	0.65	0.66	61.2	9.03	10.95	63	17	0.37	0.24	41.8
Hock-Stk	1.08	0.22	9468	0	1.06	0.62	68.7	1.08	0.16	3658	0	0.79	0.43	58.3
Ricker	2.91	1.10	0.01442	0.00420	0.66	0.61	59.6	2.72	0.61	0.01342	0.00251	0.37	0.07	41.1

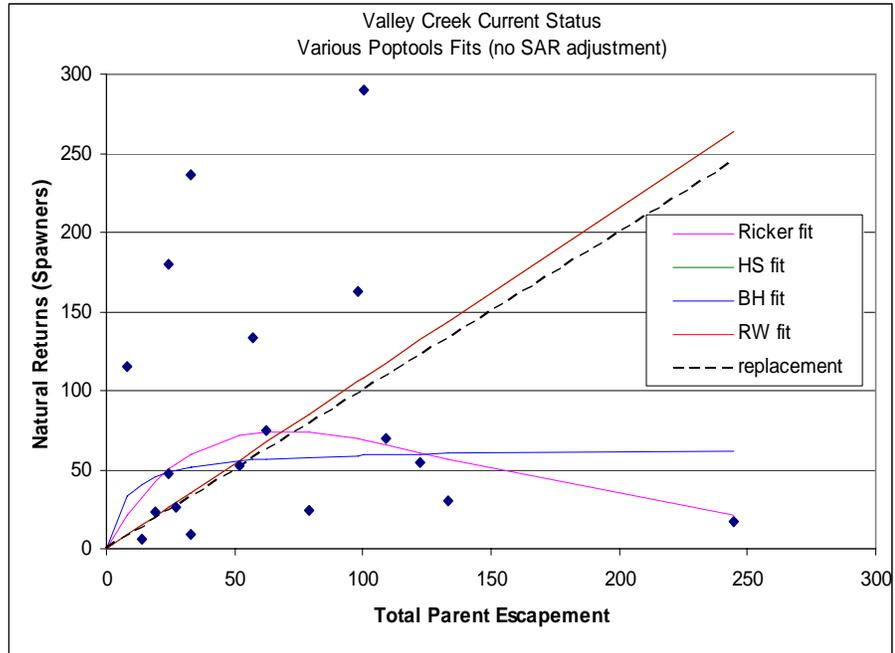


Figure 7. Stock recruitment curves for the Valley Creek chinook population. Data not adjusted for marine survival. Points used in the current productivity calculation are bolded.

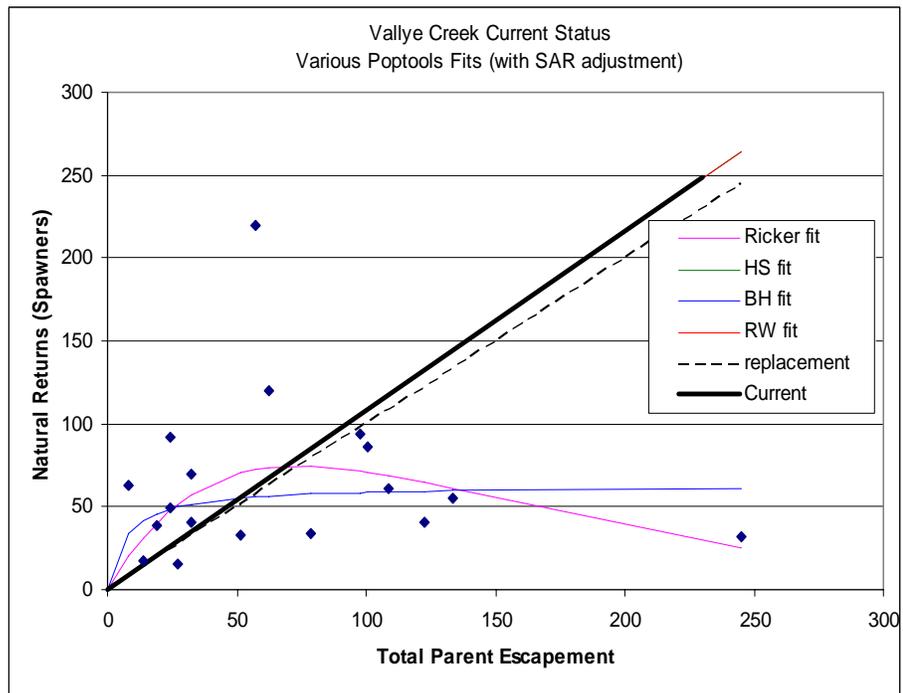


Figure 8. Stock-recruitment curves for the Valley Creek chinook population. Data adjusted for marine survival. Points used in the current productivity calculation are bolded.